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# IMPACT OF CAFFEINE INTAKE ON DIET AND WEIGHT LOSS AMONG SAUDI POPULATION: A CROSS-SECTIONAL STUDY

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**Abstract:**

***Objective:*** *To investigate the impact of caffeine intake on diet and weight loss among the Saudi population.*

***Methods:*** *This research will utilize a cross-sectional study design to examine the impact of caffeine intake on diet and weight loss among the Saudi population. Cross-sectional studies are well-suited for investigating associations and trends within a specific population at a single point in time, making them a suitable choice for this research question.*

***Results:*** *The study included 610 participants. The most frequent age among them was 25-30 years (n= 164, 27%), followed by less than 25 years (n= 162, 26.6%). The most frequent gender among study participants was female (n= 416, 68%) followed by male (n= 194, 32%). The most frequent body mass index (BMI) value among study participants was normal 18.5-24.9 kg/m$^2$ (n= 226, 37%), followed by overweight 25-29.9 kg/m$^2$ (n= 192, 31%). The most frequent Nationality among them was Saudi (n= 559, 92%), other hands non-Saudi (n= 51, 8%). Source of caffeine among study participants, with most of them having drink coffee (n= 460, 75.4%) followed by tea (n= 93, 15.2%), and the least common is Macha (n= 7, 1.1%). The most frequent of how many kilos were lost among them it was didn't lose any weight (n= 507, 83.1%), followed by loss 1-2 kilos (n= 72, 11.8%). The most frequent of how many kilos were gained among them it was didn't gain any weight (n= 539, 88.4%), followed by gain 1-2 kilos (n= 45, 7.4%). The most frequent of kinds of coffee among them it was caffeine coffee (n= 535, 88%), other hand the decaf coffee (n= 75, 12%).*

***Conclusion:*** *The study results showed that most participants were normal weight, followed by overweight, and most were Saudi and had a university education. Most of them take caffeine from drinking coffee with caffeine without any additives. The reason most participants drink coffee is to enjoy it.*

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## INTRODUCTION:

Longitudinal studies have connected increased coffee intake with a decreased chance of developing type 2 diabetes mellitus, despite short-term metabolic studies suggesting deleterious effects of caffeine on insulin sensitivity [1]. An advantageous impact of caffeine on weight, a significant predictor of diabetes, may contribute to the inverse connection between coffee and diabetes. Previous short-term studies demonstrating an enhanced metabolic rate and thermogenesis following caffeine administration [3] provide weight to this theory.

Many people who are trying to lose weight turn to supplements containing a mix of caffeine and ephedra alkaloids. Only this herbal formulation has shown any weight reduction benefit in randomized clinical studies [4]. However, these trials only lasted for around six months [5-9] and did not look at caffeine's effects over the long haul. Only one other research has looked at the link between caffeine use and weight change in the past [10], so far as we are aware.

The research problem at the core of this study stems from the pressing concern of obesity and its associated health consequences in Saudi Arabia. In recent years, the country has witnessed a dramatic increase in obesity rates, which has been linked to various chronic health conditions, including diabetes, cardiovascular diseases, and hypertension. Despite the significance of this issue, there is a notable lack of comprehensive research addressing the role of caffeine consumption in the Saudi population's dietary patterns and weight management efforts. This research problem seeks to investigate whether caffeine intake, particularly through traditional coffee consumption, plays a substantial role in affecting diet and weight loss within the Saudi context.

Another aspect of the research problem lies in the unique cultural and dietary habits in Saudi Arabia. The country has a rich tradition of coffee consumption, particularly Arabic coffee, which has become an integral part of social gatherings and hospitality. Understanding the potential impact of caffeine from such sources on dietary choices and weight management is essential in tailoring effective health interventions. It is crucial to explore whether these cultural practices align with or diverge from global trends regarding caffeine and its influence on weight loss, which forms a significant knowledge gap this study aims to address.

Additionally, the research problem seeks to uncover whether caffeine can be leveraged as an affordable and accessible solution to address the obesity epidemic in Saudi Arabia. With limited access to certain weight management resources, caffeine, if found to be effective, could offer a cost-effective and culturally relevant approach to promoting healthier dietary choices and aiding weight loss efforts. This aspect of the problem carries implications for public health policy and interventions, both within Saudi Arabia and in other regions with similar cultural and dietary practices.

## METHODS:

Study design

This research will utilize a cross-sectional study design to examine the impact of caffeine intake on diet and weight loss among the Saudi population. Cross-sectional studies are well-suited for investigating associations and trends within a specific population at a single point in time, making them a suitable choice for this research question.

Study approach

The study will be conducted in various regions across Saudi Arabia, encompassing both urban and rural areas to ensure a representative sample of the population's diversity in terms of lifestyle, dietary habits, and access to healthcare services.

Study population

The target population for this study comprises adult residents of Saudi Arabia, aged 18 years and above. This diverse population will represent various ethnic, socio-economic, and cultural backgrounds.

Study sample
A representative sample will be selected through stratified random sampling to ensure the inclusion of individuals from different age groups, genders, and geographic locations. The sample size will be calculated to achieve adequate statistical power and precision. The sampling process will involve identifying strata based on demographic factors and selecting random samples from each stratum.

Study tool
For the current study, the questionnaire was adopted for data collection, which was also categorized as a study tool.

Data collection
Data will be collected through an online questionnaire in Google Forms.

Data analysis
The collected data will be analyzed using statistical software. Descriptive statistics will be used to present the characteristics of the study population, while inferential statistics like regression analysis, chi-squared tests, and correlation analysis will be employed to examine relationships between caffeine intake, dietary patterns, and weight loss efforts. Results will be reported as odds ratios, mean differences, and p-values as appropriate using SPSS software.

Ethical considerations
Ethical considerations will be strictly adhered to throughout the study. The research will obtain informed consent from all participants, ensuring their rights, privacy, and confidentiality are protected. Ethical approval will be sought from the relevant institutional review board or ethics committee, and the study will comply with the principles of the Declaration of Helsinki and other relevant ethical guidelines. Participants' data will be anonymized and stored securely to protect their privacy and confidentiality.

## RESULTS:

The study included 610 participants. The most frequent age among them was 25-30 years (n= 164, 27%), followed by less than 25 years (n= 162, 26.6%). Figure 1 shows the age distribution among study participants. The most frequent gender among study participants was female (n= 416, 68%) followed by male (n= 194, 32%). Figure 2 shows the gender distribution among study participants. The most frequent body mass index (BMI) value among study participants was normal 18.5-24.9 kg/m$^2$ (n= 226, 37%), followed by overweight 25-29.9 kg/m$^2$ (n= 192, 31%). Figure 3 shows the distribution of BMI among study participants.

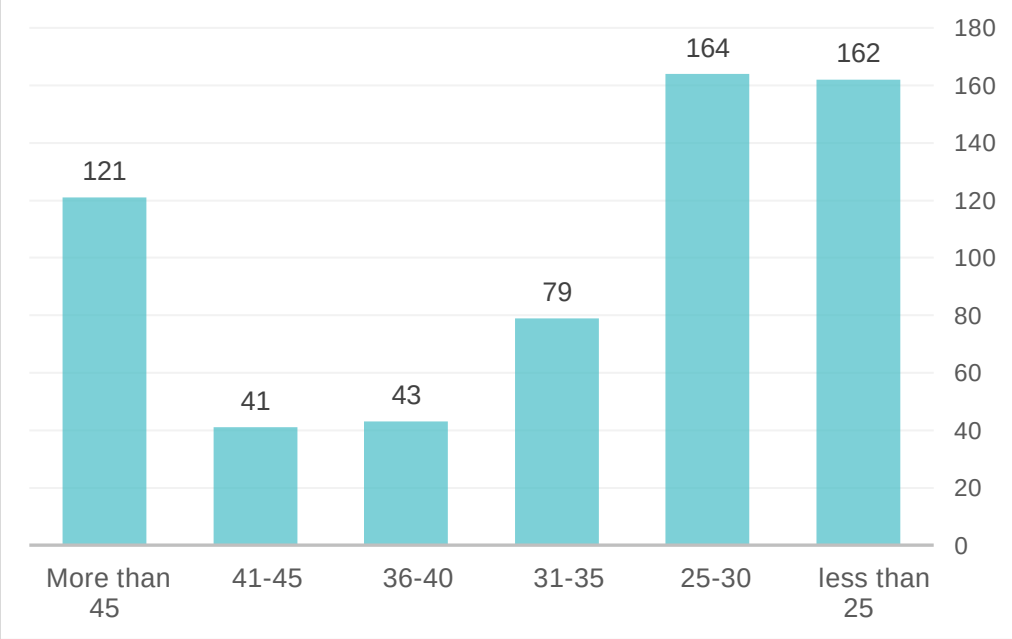


**Figure 1: Age distribution among study participants**

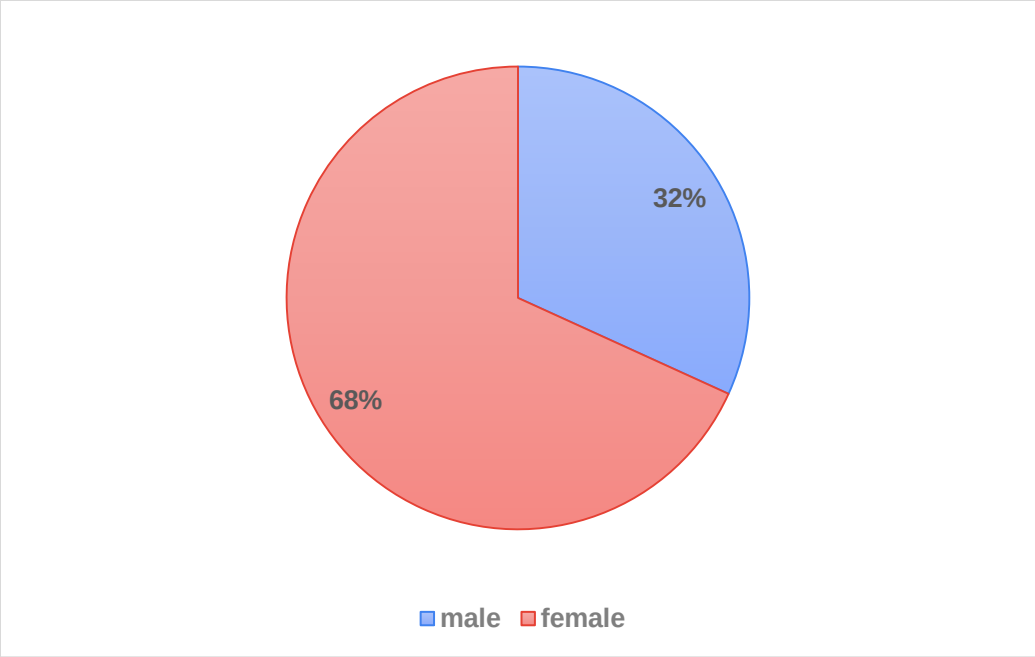


**Figure 2: Gender distribution among study participants**


**Figure 3: BMI distribution among study participants**

The most frequent of Nationality among them was Saudi (n= 559, 92%), other hands non Saudi (n= 51, 8%). Figure 4 shows the percent of nationality distribution among the study.

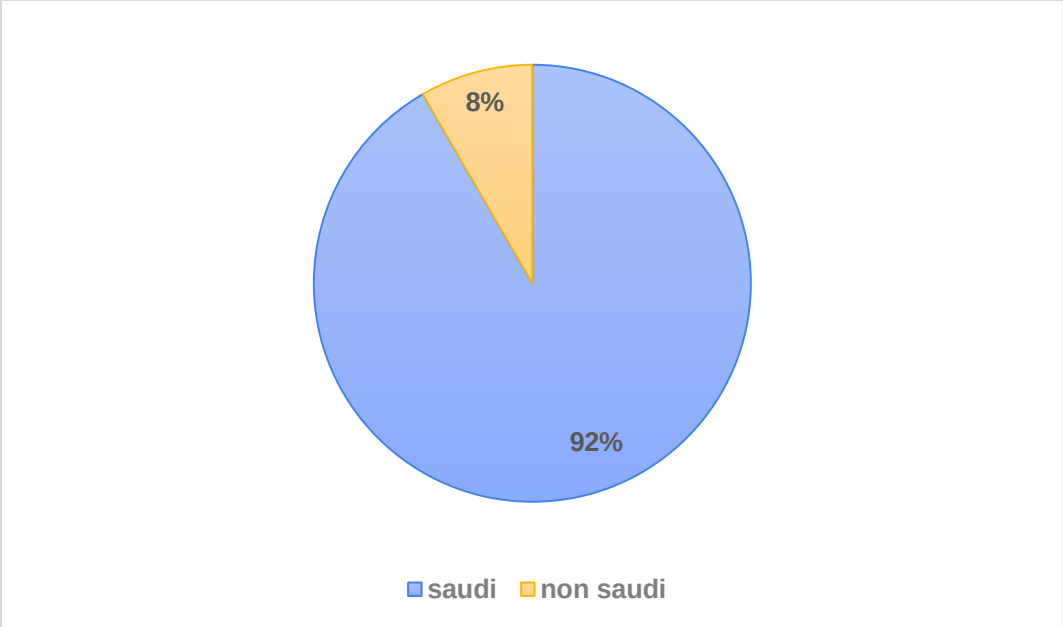


**Figure 4: Nationality distribution among study participants**

Source of caffeine among study participants, with most of them having drink coffee (n= 460, 75.4%) followed by tea (n= 93, 15.2%), and the least common is Macha (n= 7, 1.1%). The perceived source of caffeine intake is presented in Figure 5.

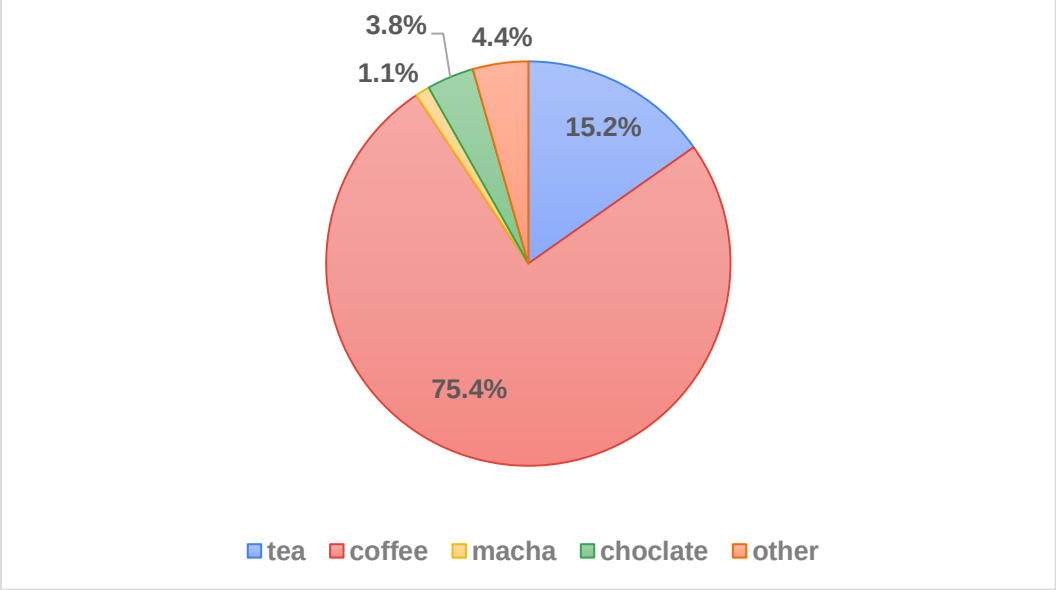


**Figure 5: Source of caffeine distribution among study participants**

The most frequent of how many kilos were lost among them it was didn't lose any weight (n= 507, 83.1%), followed by loss 1-2 kilos (n= 72, 11.8%). The most frequent of how many kilos were gained among them it was didn't gain any weight (n= 539, 88.4%), followed by gain 1-2 kilos (n= 45, 7.4%).
The most frequent of type of coffee among them it was caffeine coffee (n= 535, 88%), other hand the decaf coffee (n= 75, 12%).

Participants were asked to rate their beliefs about coffee and caffeine. Their responses and results are shown in Table 1.

Table 1: Participants responses' to survey scale items

| scale item | Yes | No | don't know |
|---|---|---|---|
| Do you think coffee makes you gain weight? | 57 | 435 | 118 |
| | 9% | 71% | 19% |
| Do you think that coffee reduces your weight? | 121 | 323 | 166 |
| | 20% | 53% | 27% |
| Do you think that caffeine reduces the risk of diabetes? | 63 | 243 | 304 |
| | 10% | 40% | 50% |
| Do you think that caffeine reduces the risk of heart disease? | 120 | 267 | 223 |
| | 20% | 44% | 37% |
| Do you think that genetic differences between individuals can affect our bodies' responses to the effect of coffee on weight? | 323 | 87 | 200 |
| | 53% | 14% | 33% |
| Do you think that the caffeine in coffee helps metabolism? | 172 | 168 | 270 |
| | 28% | 28% | 44% |

Participants were asked about the time of drink there cup of coffee, the most of them answered there is no specific time (n=313, 51.3%), followed early in the morning (n=206, 33.8%). Figure 6 shows the distribution of the time of drink coffee among study participants.

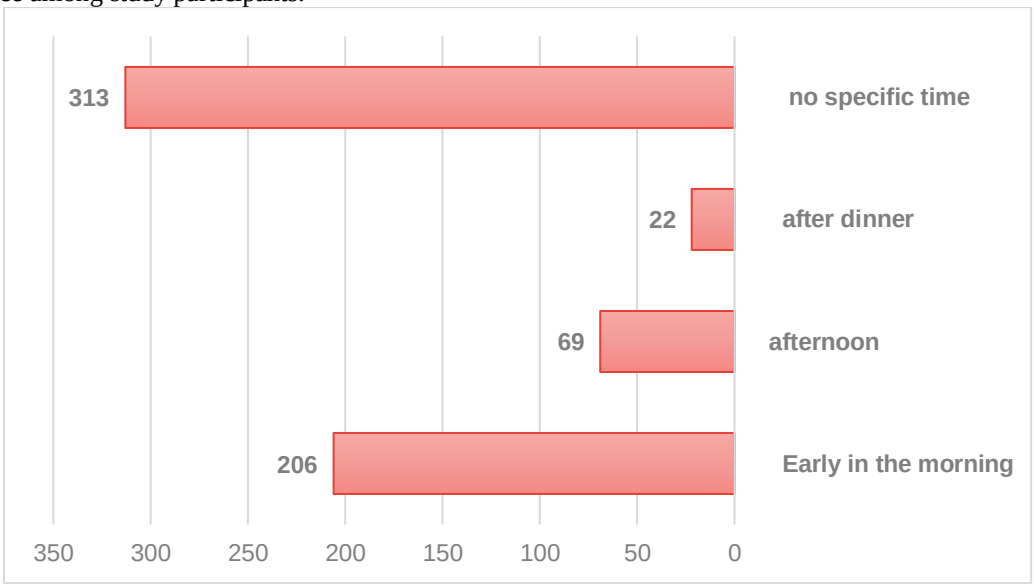


**Figure 6: Time of drink coffee distribution among study participants**

## DISCUSSION:

Caffeine, a naturally occurring central nervous system stimulant found in coffee, tea, soft drinks, and various dietary supplements, has been a subject of substantial interest and research in the context of its impact on dietary patterns and weight management [11-14].

One of the central themes in caffeine research pertains to its influence on metabolism. Caffeine is well-documented to increase resting metabolic rate (RMR) and thermogenesis, thus potentially enhancing energy expenditure. The mechanism behind this metabolic boost involves the release of catecholamines, which promote lipolysis and stimulate the breakdown of stored fat. This thermogenic effect has led to caffeine being explored as a potential aid in weight management. However, the impact of caffeine can vary depending on factors such as individual tolerance and dosage [15-17].

## CONCLUSION:

The study results showed that most participants were normal weight, followed by overweight, and most were Saudi and had a university education. Most of them take caffeine from drinking coffee with caffeine without any additives. The reason most participants drink coffee is to enjoy it.

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**ANNEX 1: DATA COLLECTION TOOL**

1. How old are you?
   - less than 25
   - 25-30
   - 31-35
   - 36-40
   - 41-45
   - More than 45

2. What is your gender?
   - Male
   - Female

3. What is your Nationality?
   - Saudi
   - Not Saudi

4. What is your educational level?
   - uneducated
   - the school
   - the university

5. What is your marital status?
   - Single
   - Married
   - divorced
   - widow

6. What is your height?
   - <150 cm
   - 151-160 cm
   - 161-170 cm
   - 171-180 cm
   - >181 cm

7. What is your weight?
   - <50 Kg
   - 51-65 Kg
   - 66-75 Kg
   - 76-85 Kg
   - 86-95 Kg
   - >96 Kg

8. What is your BMI value?
   - <18.5
   - 18.5-24.9
   - 25-29.9
   - 30-34.9
   - >35

9. What is the source of your daily caffeine?
    - Tea
    - Coffee
    - Macha
    - Chocolate
    - others

10. What time of day do you drink a cup of coffee?
    - Early in the morning
    - afternoon
    - after dinner
    - no specific time

11. Do you think coffee makes you gain weight?
    - Yes
    - No
    - don't know

12. Do you think that coffee reduces your weight?
    - Yes
    - No
    - don't know

13. Do you think that caffeine reduces the risk of diabetes?
    - Yes
    - No
    - don't know

14. Do you think that caffeine reduces the risk of heart disease?
    - Yes
    - No
    - don't know

15. How many cups of coffee do you drink during the day?
    - One cup
    - 2-3 cups
    - 4-5 cups
    - More the 5 cups

16. Do you think that genetic differences between individuals can affect our bodies' responses to the effect of coffee on weight?
    - Yes
    - No
    - Don't know

17. Do you drink black coffee with additions?
    - Without additions
    - milk
    - sugar
    - artificial flavor
    - Chocolate
    - Other additions
    - Protein meals

18. What type of coffee do you drink??
    - Decaf coffee
    - Caffeine coffee

19. How many kilograms did you lose because of drinking caffeine drinks during the month?
    - Didn't lose any weight
    - 1-2 kilogram
    - 3-5 kilogram
    - More than 5 kilograms.

20. How many kilograms did you gain from drinking caffeine during the month?
    - Didn't gain any weight
    - 1-2 kilogram
    - 3-5 kilogram
    - More than 5 kilograms

21. Do you crave any sweets with a cup of coffee?
    - Yes
    - No

22. Do you think that the caffeine in coffee helps metabolism?
    - Yes
    - No
    - Don't know

23. What kind of coffee do you drink?
    - Instant coffee
    - Brewed coffee
    - Freshly ground coffee beans

24. What is the reason for drinking coffee?
    - Weight loss
    - Gain weight
    - Maintain weight
    - Enjoy it

**APPENDIX 2: Participants responses to scale items**

| Participants responses to survey scale items | | | |
|---|---|---|---|
| scale item | Yes | No | don't know |
| Do you think coffee makes you gain weight? | 57 | 435 | 118 |
| | 9% | 71% | 19% |
| Do you think that coffee reduces your weight? | 121 | 323 | 166 |
| | 20% | 53% | 27% |
| Do you think that caffeine reduces the risk of diabetes? | 63 | 243 | 304 |
| | 10% | 40% | 50% |
| Do you think that caffeine reduces the risk of heart disease? | 120 | 267 | 223 |
| | 20% | 44% | 37% |
| Do you think genetic differences between individuals can affect our bodies' responses to the effect of coffee on weight? | 323 | 87 | 200 |
| | 53% | 14% | 33% |
| Do you think that the caffeine in coffee helps metabolism? | 172 | 168 | 270 |
| | 28% | 28% | 44% |

**SPSS:**

**age**

| | Frequency | Percent |
|---|---|---|
| less than 25 | 162 | 26.6% |
| 25-30 | 164 | 26.9% |
| 31-35 | 79 | 13% |
| 36-40 | 43 | 7% |
| 41-45 | 41 | 6.7% |
| More than 45 | 121 | 19.8% |
| Total | 610 | 100% |

**gender**

| | Frequency | Percent |
|---|---|---|
| male | 194 | 32% |
| female | 416 | 68% |
| Total | 610 | 100% |

**Nationality**

| | Frequency | Percent |
|---|---|---|
| Saudi | 559 | 92% |
| non Saudi | 51 | 8% |
| Total | 610 | 100% |

**educational level**

| | Frequency | Percent |
|---|---|---|
| uneducated | 20 | 3% |
| the school | 94 | 15% |
| the university | 496 | 81% |
| Total | 610 | 100% |

**marital status**

| | Frequency | Percent |
|---|---|---|
| Single | 283 | 46% |
| Married | 287 | 47% |
| divorced | 28 | 5% |
| widow | 12 | 2% |
| Total | 610 | 100% |

**BMI**

| | Frequency | Percent |
|---|---|---|
| underweight | 38 | 6% |
| normal | 226 | 37% |
| overweight | 192 | 31% |
| obese | 101 | 17% |
| extremely obese | 53 | 9% |
| Total | 610 | 100% |

**source of caffeine**

| | Frequency | Percent |
|---|---|---|
| Tea | 93 | 15.2% |
| Coffee | 460 | 75.4% |
| Macha | 7 | 1.1% |
| chocolate | 23 | 3.8% |
| other | 27 | 4.4% |
| Total | 610 | 100% |

**coffee time**

| | Frequency | Percent |
|---|---|---|
| Early in the morning | 206 | 33.8% |
| afternoon | 69 | 11.3% |
| after dinner | 22 | 3.6% |
| no specific time | 313 | 51.3% |
| Total | 610 | 100.0% |

**cups of coffee**

| | Frequency | Percent |
|---|---|---|
| One cup | 286 | 46.9% |
| 2-3 cups | 225 | 36.9% |
| 4-5 cups | 64 | 10.5% |
| More the 5 cups | 35 | 5.7% |
| Total | 610 | 100% |

**Addition with coffee**

| | Frequency | Percent |
|---|---|---|
| Without additions | 323 | 53.0% |
| milk | 186 | 30.5% |
| sugar | 41 | 6.7% |
| artificial flavor | 6 | 1.0% |
| Chocolate | 16 | 2.6% |
| Other additions | 32 | 5.2% |
| Protein meals | 6 | 1.0% |
| Total | 610 | 100% |

**kind of coffee**

| | Frequency | Percent |
|---|---|---|
| Decaf coffee | 75 | 12% |
| Caffeine coffee | 535 | 88% |
| Total | 610 | 100% |

**many kilo lost**

| | Frequency | Percent |
|---|---|---|
| Didn't lose any weight | 507 | 83.1% |
| 1-2 kilogram | 72 | 11.8% |
| 3-5 kilogram | 22 | 3.6% |
| More than 5 kilograms. | 9 | 1.5% |
| Total | 610 | 100.0% |

**many kilo gain**

| | Frequency | Percent |
|---|---|---|
| Didn't gain any weight | 539 | 88.4% |
| 1-2 kilogram | 45 | 7.4% |
| 3-5 kilogram | 16 | 2.6% |
| More than 5 kilograms | 10 | 1.6% |
| Total | 610 | 100% |

**reason for drink coffee**

| | Frequency | Percent |
|---|---|---|
| Weight loss | 27 | 5% |
| Gain weight | 10 | 2% |
| Maintain weight | 4 | 1% |
| Enjoy it | 569 | 93% |
| Total | 610 | 100% |

**type of coffee**

| | Frequency | Percent |
|---|---|---|
| Instant coffee | 55 | 9% |
| Brewed coffee | 185 | 30% |
| Freshly ground coffee beans | 370 | 61% |
| Total | 610 | 100% |

**Chi-Square Test**

**Test Statistics**

| | Source of caffeine | Coffee time | gain weight | lose weight | diabetes | heart disease | Cups coffee |
|---|---|---|---|---|---|---|---|
| Chi-Square | 1206.033[a] | 345.082[b] | 405.072[c] | 110.620[c] | 154.430[c] | 55.990[c] | 293.226[b] |
| df | 4 | 3 | 2 | 2 | 2 | 2 | 3 |
| Asymp. Sig. | .000 | .000 | .000 | .000 | .000 | .000 | .000 |

**Test Statistics**

| | Genetic diffrence | Addition with coffee | Type coffee | Many kilo lost | Many kilo gain | Any sweet with coffee | metabolism |
|---|---|---|---|---|---|---|---|
| Chi-Square | 137.039[a] | 1019.026[b] | 346.885[c] | 1113.266[d] | 1310.669[d] | 126.695[c] | 32.826[a] |
| df | 2 | 6 | 1 | 3 | 3 | 1 | 2 |
| Asymp. Sig. | .000 | .000 | .000 | .000 | .000 | .000 | .000 |

**Test Statistics**

| | Kind coffe | Reason for drink coffee | BMI |
|---|---|---|---|
| Chi-Square | 246.475[a] | 1518.564[b] | 229.295[c] |
| df | 2 | 3 | 4 |
| Asymp. Sig. | .000 | .000 | .000 |

all P-value = 0 < 0.05

To test the independence between variable using chi-square test and prove it all independent

**Regression**

**ANOVA**

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Source of caffeine | Between Groups | 7.369 | 4 | 1.842 | 2.623 | .034 |
| | Within Groups | 424.875 | 605 | .702 | | |
| | Total | 432.244 | 609 | | | |
| Coffee time | Between Groups | 16.946 | 4 | 4.237 | 2.243 | .063 |
| | Within Groups | 1142.785 | 605 | 1.889 | | |
| | Total | 1159.731 | 609 | | | |
| Cups coffee | Between Groups | 2.911 | 4 | .728 | .980 | .418 |
| | Within Groups | 449.214 | 605 | .743 | | |
| | Total | 452.125 | 609 | | | |
| Addition with coffee | Between Groups | 10.138 | 4 | 2.535 | 1.303 | .268 |
| | Within Groups | 1177.147 | 605 | 1.946 | | |
| | Total | 1187.285 | 609 | | | |
| Type Coffee | Between Groups | 1.741 | 4 | .435 | 4.111 | .003 |
| | Within Groups | 64.038 | 605 | .106 | | |
| | Total | 65.779 | 609 | | | |
| Kind of coffee | Between Groups | 9.086 | 4 | 2.271 | 2.923 | .021 |
| | Within Groups | 470.095 | 605 | .777 | | |
| | Total | 479.180 | 609 | | | |

There is a significance different between BMI and (source of caffeine, Type of coffee and Kind of coffee).